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DISSECTION OF THE GENITO-URINARY ORGANS IN A CASE OF FISSURE OF THE ABDOMINAL WALLS.

By Alban Doran, F.R.C.S. (Plate XIX.)

Ann R.C.S. Teratolog. Series no 668

In September 1880, Mr Ritchie Norton, of Tottenham, presented to the Museum of the Royal College of Surgeons a monstrous fœtus. The abdominal walls were entirely deficient except immediately above the pubis, the viscera hanging freely from the body. On closer inspection, I found that the genito-urinary organs were imperfectly developed and malformed to a degree rare, even in cases of complete extroversion of the abdominal viscera. The nature of the series of malformations which I detected in those organs will be presently described.

The mother was a healthy married woman, and was confined at the end of the seventh month of pregnancy. The fœtus was born alive, and Mr Norton observed that it continued to breathe for a quarter of an hour after birth, and the pulsations of the heart were perceptible for three quarters of an hour.

The fœtus measured not quite a foot from the vertex to the right heel when the right leg was extended, but its shortness was due, to a great extent, to spinal deformity; the limbs were plump and the thorax broad. The head was well formed, measuring $3\frac{3}{4}$ inches antero-posteriorly, and $2\frac{3}{4}$ inches between the parietal eminences. There was neither meningocele nor deformity of the face, lips, or any part of the palate. Spina bifida existed in the lower lumbar region, forming a globular projection under the skin 2 inches in diameter; the bodies of the upper lumbar vertebræ were rotated to the left, and the entire lumbar spine much curved laterally, with its convexity to the right. The integument of the thorax showed, when fresh, a distinct pale cicatricial line extending from the neck, along the right of the sternum, to the upper border of the fissure in the abdomen. The lungs were normal, and the pericardium distinct from the pleuræ, the ductus arteriosus and foramen ovale cordis were both patent. The diaphragm and thoracic walls were complete, the pharynx and œsophagus pervious. The left lower extremity

was somewhat thinner than the right, and the left foot, though not arrested in growth, was deformed by talipes equino-varus.

In the front of the abdomen were two great oval apertures completely separated by a narrow bridge of integument, which included, somewhat to the left of the median line, the umbilicus. The orifice of the umbilical vein was patent, and a stout probe could be passed along that vessel as far as to the liver. The upper aperture was the greater, its border was completely lined by the amnion which blended with the peritoneum very intimately, and with the integument by a reddish, slightly elevated line of demarcation. The amnion hung like an apron over the abdominal viscera. The liver was normal, and several inches of intestine could be traced from the stomach to the abnormal blind termination of the intestinal canal presently to be described. The entire canal, including the stomach, was held loosely to the back part of the abdomen by a simple mesentery, and no great omentum existed. The umbilical vein formed an abnormally deep fold in the peritoneum. The spleen was connected with the stomach by the usual serous fold, and the dilated right kidney had apparently pushed itself forwards into a fold of peritoneum which partially invested its posterior surface.

Below the bridge of skin containing the umbilicus was another aperture, shown in fig. 1, oval, and over 2 inches in horizontal diameter, by $1\frac{1}{2}$ inch, measured vertically. There was a considerable area of integument between it and the symphysis, where the ossa pubis were nearly 1 inch apart. A few lines below the prominence which marked the spine of the left os pubis, and beyond the fold of the groin, was a minute but pervious opening (*g*), and $\frac{1}{4}$ of an inch external to this opening was a small flap of skin, placed completely on the front of the thigh. There was a similar flap on the right side $\frac{1}{4}$ of an inch below the spine of the right os pubis. These flaps appeared to consist of erectile tissue, and appeared to represent the labia minora.

The great oval aperture below the umbilicus merited particularly careful observation and dissection. It was not a large hole opening freely into the abdominal cavity, like that above the umbilicus. The integument was entirely deficient, but the

gap was covered in by a very thick aponeurosis from the abdominal muscles, often seen in this kind of malformation. The integumental edges of the aperture overhung this aponeurotic floor, on the surface of which was the bladder, represented by two oval elevated and sharply-bordered patches of corrugated mucous membrane, each covering a disc of muscular tissue (fig. 1, *b'*, *b*.). These two half-bladders, as they may conveniently be termed, were separated by $\frac{1}{4}$ of an inch of smooth, shiny tissue, which lined the entire floor, excepting that part occupied by these vesical elements. In the upper part of the smooth tract between them was a circular aperture (*d*) $\frac{1}{4}$ of an inch wide when gently stretched; it communicated with the intestine above by a narrow elliptical opening, and led directly into the intestine below, which ended as a blind extremity 1 inch beyond the aperture. The mucous membrane of the intestine to the very blind extremity was marked with well-formed valvulæ conniventes.

On the upper and outer border of the right half-bladder was an opening $\frac{1}{10}$ of an inch in diameter (*e*). This I naturally took for the orifice of the ureter, but further dissection showed that it communicated with a right half-uterus. Close to the lower and inner border of the left half-bladder was a prominent nipple-like projection $\frac{1}{8}$ of an inch long (*f*), the vesical mucous membrane was continued on to its sides, and its apex was perforated by the orifice of a canal. The projection appeared like an abnormal termination of the left ureter, but on passing a probe into the canal, that instrument could readily be made to appear out of the opening below the left groin; in fact, the canal was complete throughout, as will presently be explained. On the smooth tissue external to each half-bladder, a very faint depression (*c*, *c'*) marked the lower end of each of the ureters, here quite impervious.

Turning to the deep dissection of the abdomen, I found not only curvature in the lumbar region, but also great distortion of the sacrum, which was curved upwards to such an extent that the tip of the coccyx was high above the level of the brim of the pelvis. A stout ligamentous band passed between the coccyx and the ligament which connected the gaping pubic bones. Hence the cavity of the true pelvis was divided into

two shallow depressions. Into the right nothing passed but vessels representing the branches of the internal iliac artery; the left half of the pelvic cavity transmitted a curved tube, 1 inch in length and $\frac{1}{8}$ of an inch in calibre throughout. This tube connected the nipple-like projection close to the left half-bladder with the opening below the left groin. It was lined with mucous membrane and filled with sebaceous matter.

The abdominal aorta exhibited marked anomalies in its branches. The sketch shows the peculiarities as far as I could precisely certify by dissection; I leave out the phrenic mesenterics, supra-renal, spermatic, and sacra media arteries, since I failed to trace them. The cœliac axis was given off $\frac{1}{2}$ an inch below the diaphragm, and at almost the same point the aorta divided into a right common iliac artery $\frac{1}{8}$ of an inch in diameter, and a left, hardly one-third as wide. The right was really the aorta directly continued downwards, the left iliac was given off at a wide angle from the parent trunk. After running for nearly $\frac{3}{4}$ of an inch and giving off the right renal artery, the right common iliac divided into three branches, namely, a long and very broad right hypogastric, a slender right external iliac, and a still narrower left hypogastric, which gave off three pelvic branches representing some of the divisions of the normal internal iliac, and also, like the right hypogastric, sent a twig to the rudimentary and cloven bladder. These hypogastrics ran in the stout aponeurosis behind the lower integumental aperture in the abdomen, up to the umbilicus. The left common iliac was short owing to the great distortion of the lumbar spine; it divided into a left external iliac branch, and a left internal iliac remarkable for giving off the left renal artery.

The right kidney was dilated, forming a cyst 2 inches long by $1\frac{1}{2}$ inch broad; its lobular structure was still apparent. The ureter was 3·9 inches long, and uniformly $\frac{1}{5}$ of an inch in calibre, and quite pervious from the renal pelvis to within $\frac{1}{8}$ of an inch of the bladder, where it was reduced to a mere fibrous cord that passed through the aponeurosis, and could be traced in front as an almost imperceptible linear depression external to the elevated right half-bladder. The left kidney was 1·9 inches in vertical diameter, and 0·6 inch broad, its ureter 3 inches long and nearly $\frac{1}{4}$ of an inch broad throughout, excepting close to the

lower end where, like its fellow, it was reduced to an impervious fibrous cord. This cord passed in front of the rudimentary left half-uterus, and ended as an almost imperceptible depression on the smooth surface external to the left half-bladder.

Searching for the internal generative organs, the sex of the fœtus became evident on a glance at the conspicuous structure on the left side, behind the lateral abdominal wall (fig. 3). It looked at first like an entire uterus and appendages, rather unsymmetrical, yet complete. Further dissection showed that it represented only half the internal organs, but remarkably well-finished as to ovary and tube, considering the condition of the corresponding parts on the right side.

In fact, the internal genitals showed a strange "mis-building," as a German would say, for it was evident that the ducts of Müller had never united, and the right duct had developed into the semblance of the right organs of an *Ornithorhynchus*, non-development of the ovary included. The left duct had tried, as it were, to become one-half of a placental mammal's organs, but the effort appeared to have been too much, and the body of the uterus was a decided failure. Lastly, the integumental involution that ought to have met the end of the alimentary canal has failed to do so, and has opened of itself, as the nipple-like process above described, into the urogenital sinus (as represented by the lower abdominal aperture) missing even the pervious canal of the right internal organs.

I will now describe these malformed organs more specially. The right internal genitals were represented by a curved tube nearly 2 inches long (fig. 4). The first inch (*a*) was fusiform and very thick walled; its cavity, lined with corrugated mucous membrane, opened on to the border of the right half-bladder, as above described. It bore a strong resemblance to one of the uteri of a *Didelphys*, and similar malformations have been figured and described by Kussmaul,[1] Förster,[2] and others. There was no distinction between uterus and vagina. Beyond this half-uterus was a flat, button-like projection, over $\frac{3}{10}$ of an inch in diameter; it was perforated by two foramina (*c*, *d*), entirely separated by a thick septum. The more internal foramen led

[1] *Von dem Mangel, &c., der Gebärmutter*, Wurzburg, 1859, chaps. vi. and vii.
[2] *Der Missbildungen des Menschen*, 1861.

into the uterine cavity, and hence communicated with the opening near the bladder. The more external passed into a canal which tunneled the remainder of the tube (*e*) for nearly ½ an inch, where the tube suddenly became impervious, and ended in a thin cord (*f*) with small but very distinct fimbriæ at its extremity (*g*); there was an opening in the midst of the fimbriæ admitting a bristle almost as far as to the end of the thick part of the tube. Close to this fimbriated extremity was a minute solid body (*h*) which I may liken in size to the "millet seed," so familiar to the pathologist as an object of comparison. The entire curved tube, representing the right duct of Müller, was held to the back of the right lateral abdominal wall by a short, but distinct fold of peritoneum.

On the left side, also provided with a fold of peritoneum, were the representatives of the left duct of Müller (fig. 3). This primitive canal had not developed inferiorly to such an extent as on the right side, for the vagina and body of the uterus were represented by a flat, fibrous band, inserted into the aponeurosis behind the left half-bladder. On the other hand, the upper end was as forward and as perfect as in a normal fœtus, for the fimbriated extremity of the Fallopian tube was well-developed and the ovary was present, measuring 0·4 inches in length. The tube was much contorted and dilated at the point where it joined the band representing the uterus; a kind of diverticulum, with a blind depression on its surface, appeared to represent the fundus uteri.

Out of the above abnormalities, two require more special consideration. I refer to the button-like projection on the surface of the right internal organs, and to the remarkable curved tube (fig. 5, *i*) in the pelvis. There cannot be much doubt that the first portion (fig. 4, *a*) of the right internal organs represents the uterus and, perhaps, part of the vagina. Again, the fimbriæ (*g*) settle the nature of the opposite end of the organs. Is the projection, with the apertures (*c* and *d*) an abnormality of the uterus or of the Fallopian tube? I believe that it is tubal, not uterine. Rokitansky describes certain accessory openings in the tube, in his *Lehrbuch*. He most frequently found them on the summit of a round projection on the tube, which is generally more or less contracted and bent at the same point. It is

generally admitted that the original free end of Müller's duct is represented in the adult by the "hydatid of Morgagni" that hangs from the fimbriæ. The opening is formed by a splitting of the tube below the free end; and Klob, in his *Pathologische Anatomie der Weiblichen Sexualorgane*, compares the fimbriæ to carunculæ myrtiformes. In my specimen the fissure must have originally been very long, its edges have developed fimbriæ normally at the extremity of the tube, and closed along *f* and *e*, fig. 4, but at the innermost extremity the fissure has remained open, the whole tube closing in, however, at one point —that is to say, between *c* and *d*. That *c* and *d* are apertures in the tube there can be little further doubt, when we bear in mind that they open into the peritoneal cavity, like the normal fimbriated extremity; and the complete interruption of the canal of the tube by the septum between *c* and *d*, appears to confirm my opinion, expressed above, that the tube has closed in across the proximal end of some previous fissure, which has itself remained open at *c* and *d*. This tendency of the fissure to close irregularly is further seen in the complete stricture of the tube at the point where the thick segment (*e*) meets the thin, but equally pervious portion (*f*). Though the distance from *c* to *g* is great, this need not make it appear improbable that one single fissure once extended from *c* to the true opening of the tube in the midst of the fimbriæ, since *e* and *f* could have attained their present length after the establishment of the anomaly.

What is the nature of the tube *i* (fig. 5) which extends from the projection *f* (fig. 1) close to the left half-bladder, to the opening *g* (fig. 1) in the groin? Is it an anus that has pushed itself far upwards to meet a rectum that has never been developed? I think not, for in cases of absence or imperfect formation of that part of the alimentary canal the anus itself is, as a rule at least, hardly so much as indicated. In this case I believe that the anal involution of integument at the cloaca, has never existed, or rather that *g* (fig. 1) is a cloaca, which, however, through failure of development of both vagina and rectum, has only a long, abnormal urethra—the tube *i* (fig. 5) opening into it. In fig. 1, *b* and *b'* represent the fundus of the bladder, but the smoother surface between the impervious attachment of

the ureters at *c* and *c'* and the projection at *f*, must be considered as the trigone. If so, the elements of the fundus and trigone have in this case been completely arrested in development, whilst the true female urethra, the tube *i* (fig. 5), has not only become a perfect tube, but has grown to an unnatural length, and alone of the three tubes that ought to have opened at the cloaca, has succeeded in so doing.

Failure of union of the visceral plates in the abdominal region, arrested development of the intra-abdominal part of the allantois, and persistence of a primitive condition of the alimentary tube in the region of the omphalo-mesenteric duct will account for the protrusion of the viscera, the condition of the bladder, and the opening of the intestine by an aperture far above its blind extremity and above the imperfect vesical elements. It is needless for me to give a summary of the normal development of the alimentary and genito-urinary tracts. The relation of this process to malformations of the bladder has recently been discussed at great length by Dr F. H. Champneys, in a monograph [1] which includes a very complete synopsis of all previous dissections throwing light on the subject, and of all reasonable theories on the question.

It is hardly correct to include this monstrosity on Förster's system of classification,[2] as an example of a "cloaca" in man. Such a term must be used homologically, not analogically. No observer could compare the great aperture in my specimen to the normal condition of the alimentary and genito-urinary outlets in a fish; he would have to rely on one fact alone—the opening of the intestinal canal in front (*i.e.*, above, in a human fœtus) of the vesical and external genital elements. It would be still more absurd to consider this monster to be monotrematous or sauropsidan in its alimentary and genital organs. On the other hand, in a human subject, where the rectum opens into a normal vagina, a true cloaca may be said to exist, although the parts never precisely resemble their homologues in monotremata and sauropsida. Then, could a human monster be found—I have never discovered any record of such a malforma-

[1] "A Case of Extroversion of the Bladder in a Female Child," with Dissection (*St Bartholomew's Hospital Reports*, vol. xiii. 1877).

[2] *Op. cit.*

tion—where the ureters and Fallopian tubes open at *g* (fig. 1), and where the intestinal orifice *d* opens immediately in front of *g*, there we would have a truly icthyopsidan condition.

In short, this fœtus which I dissected is an example of extreme arrest of development, not even symmetrical, with subsequent partial distortion of some of the imperfectly-formed parts. It is therefore interesting, more as an example of perverted development, than as an illustration of any morphological question.

See Matthews Duncan & Hurry. Trans. Obstet. Soc. Vol XXVI. p 266. also Dalton ibid Vol XXII. p 200 & 36

Explanation of Plate XIX.

Genito-Urinary Organs from a Case of Fissure of the Abdominal Walls.

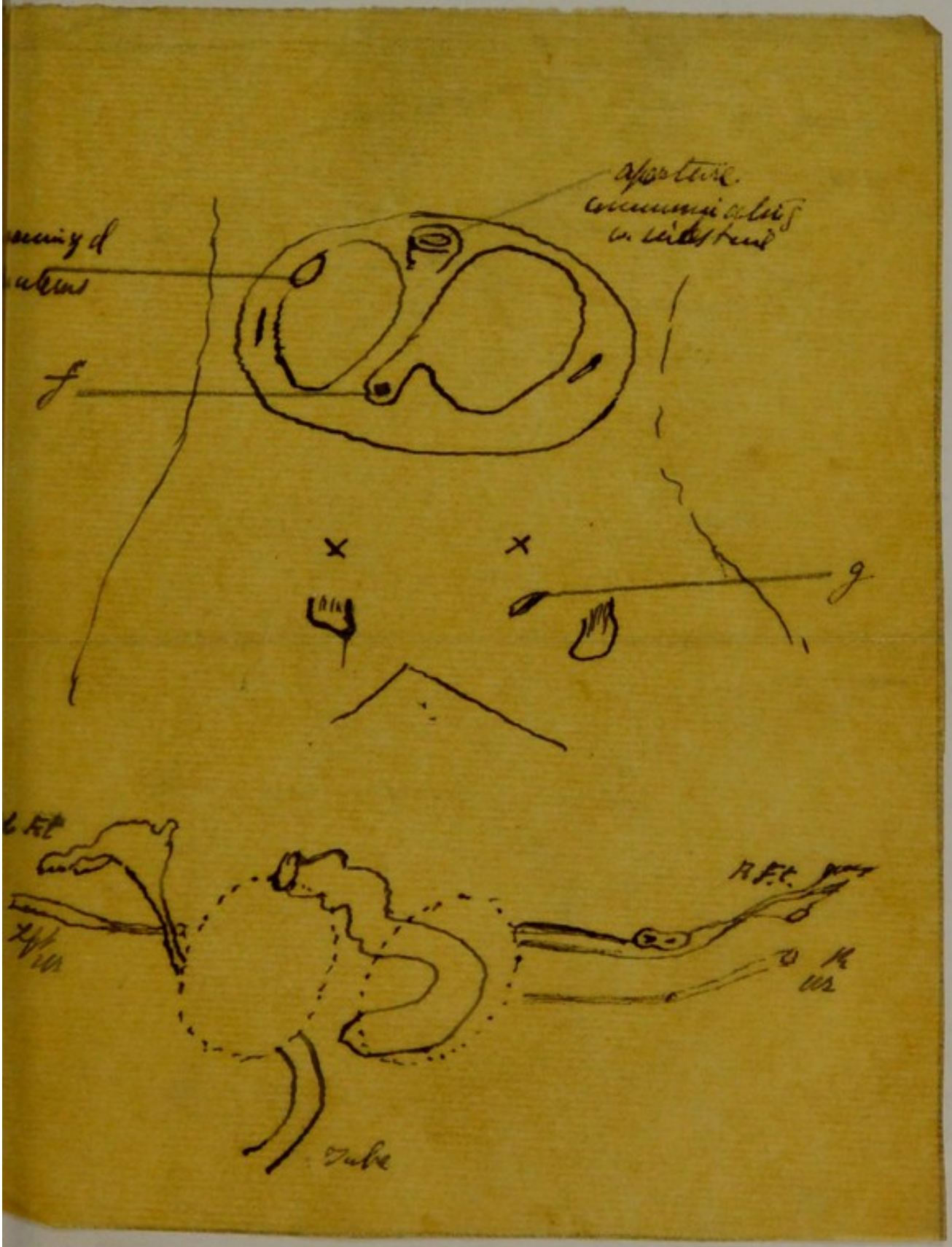
Fig. 1. General view, semi-diagramatic. *a*, Fringe of amnion attached to lower border of upper abdominal aperture; *a'*, umbilicus and patent orifice of umbilical vein; *b*, right, and *b'*, left half bladder; *c*, *c'*, depressions indicating attachments of impervious ends of ureters; *d*, aperture communicating with intestine, the horizontal slit marks the opening of the intestine above this aperture; *e*, opening of right half uterus; *f*, opening in nipple-like projection communicating by a canal with *g*, opening in integument below left groin; *h*, *h'*, labia interna; *x*, *x*, mark position of each os pubis.

Fig. 2. Plan of the branches of the abdominal aorta. *a*, Undivided trunk of aorta; *b*, cœliac axis; *c*, right common iliac artery; *d*, left common iliac; *e*, right renal; *f*, right hypogastric; *g*, right external iliac; *h*, left hypogastric, giving off three pelvic branches; *i*, left external iliac; *k*, left internal iliac; *l*, left renal artery.

Fig. 3. Left ovary, Fallopian tube and uterus. The body of the uterus is represented by a fibrous band. × 2.

Fig. 4. Right internal organs. *a*, Right half uterus, laid open to show its thick walls and cavity, *b*, which opens at the aperture, *c*, in the button-like projection; *d*, second aperture in the same projection communicating with canal in *e*; *e*, *f*, wide and narrow parts of Fallopian tube; *g*, fimbriated extremity; *h*, rudimentary ovary (?).

Fig. 5. Diagram of parts behind the structures shown in fig. 1. The position of the right half bladder is indicated by the dotted circle *a*, of the left by *a'*; *b*, ileum; *c*, blind end of alimentary canal; *d*, site of *d*, fig. 1, from behind; *e*, left, and *f*, right half of internal sexual organs; *g*, end of pervious portion of left ureter, the impervious part passes in front of the rudimentary uterus to its attachment; *h*, junction of pervious and impervious portions of right ureter; *i*, canal opening at *f* and *g*, fig. 1. × . It has been dissected out (see note p. 232) & is now surrounded with a red glass rod with the ends expanded at f & g.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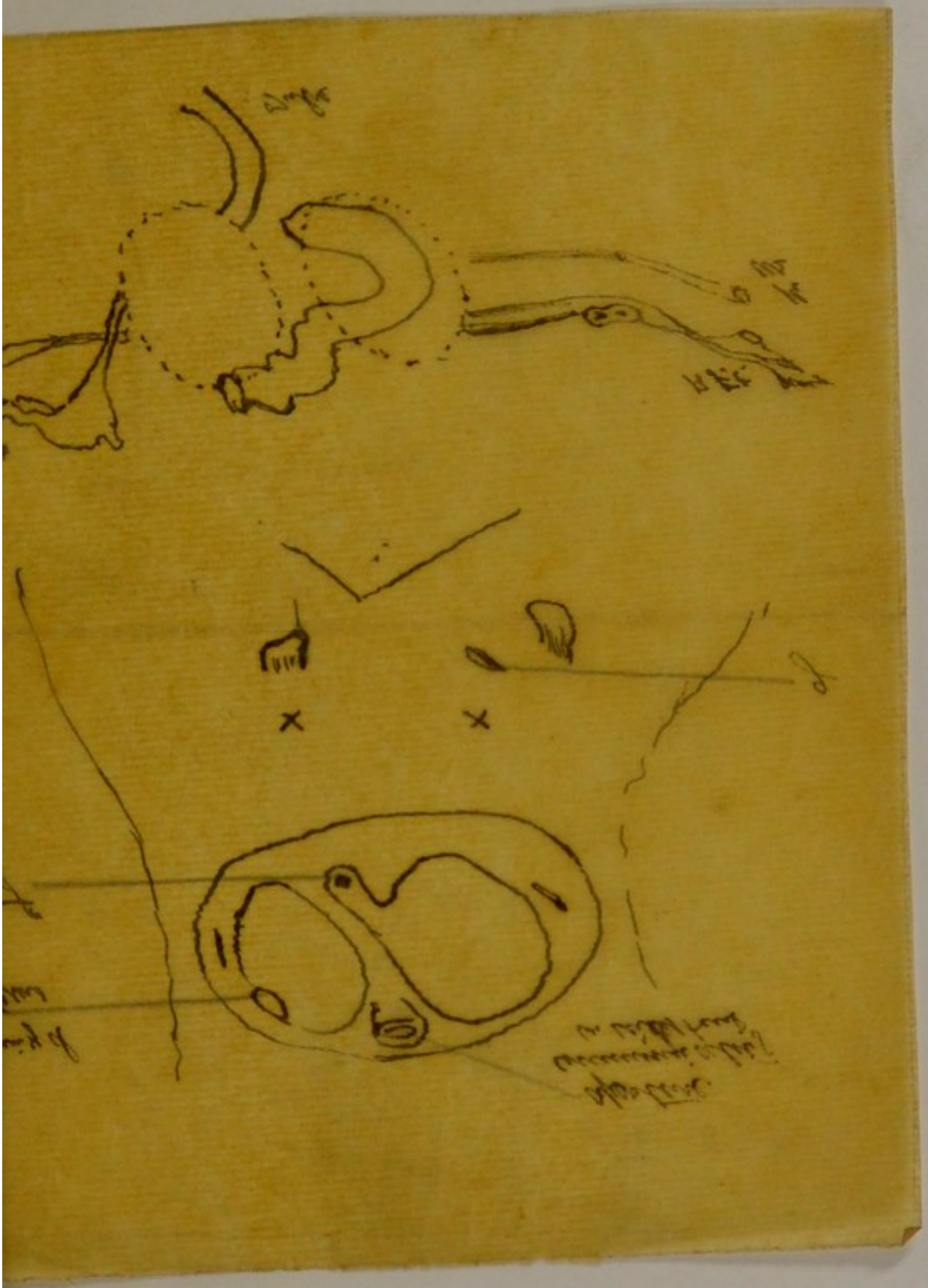


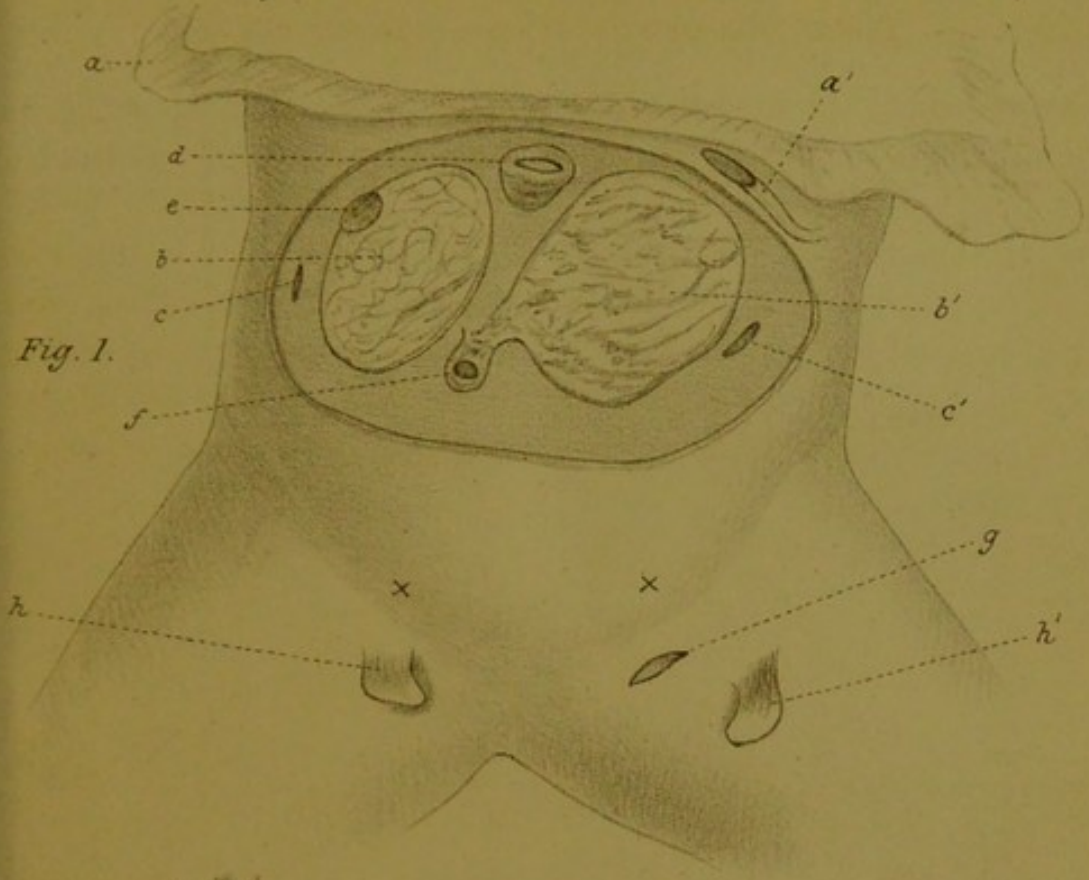


Fig. 1.

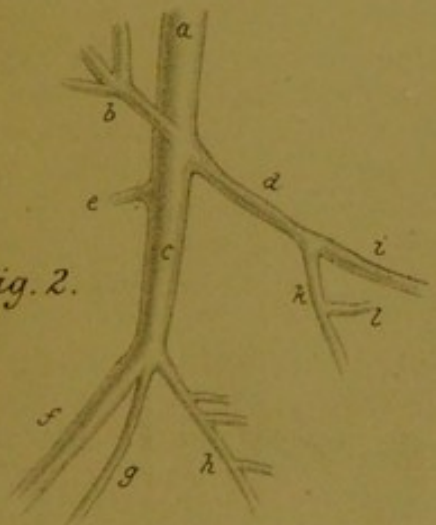


Fig. 2.

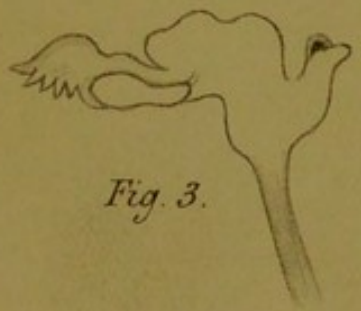
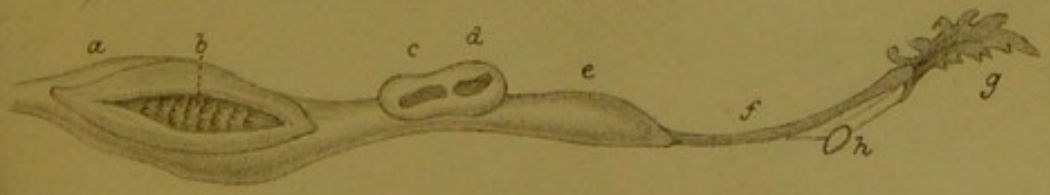


Fig. 3.

Fig. 4.



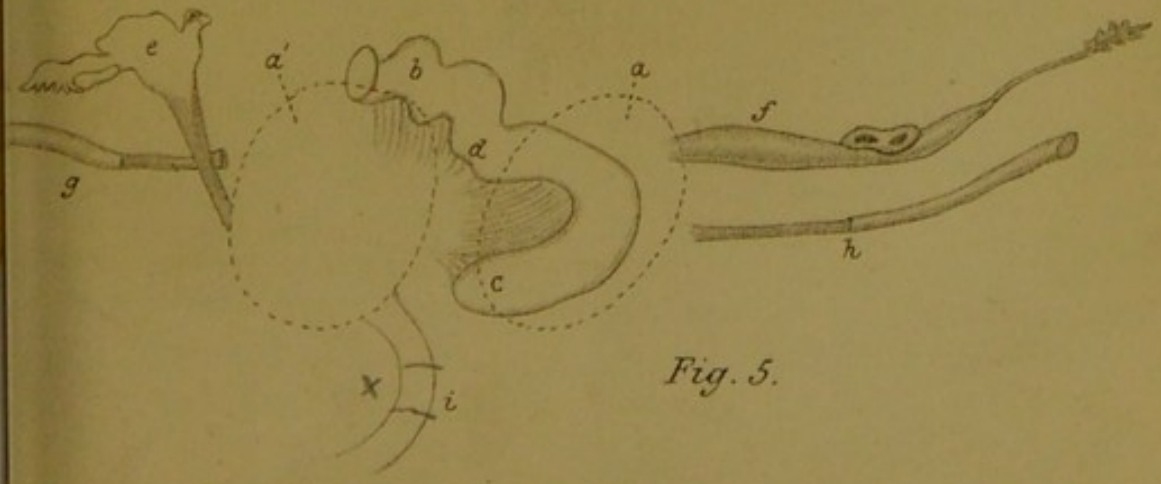


Fig. 5.

F. Huth, Lith.r Edin.r